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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/530,968	05/19/2000	JEAN-CLAUDE GROSSETIE	JEK/GROSSETI	6299

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ART UNIT	PAPER NUMBER
2872	

2872

DATE MAILED: 02/25/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

PTO-90C (Rev. 07-01)

Office Action Summary

Examiner Audrey Y. Chang	Art Unit 2872

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE <u>3</u> MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1) ☒ Responsive to communication(s) filed on *19 May 2000* .

2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.

3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4) ☒ Claim(s) *1-25* is/are pending in the application.

    4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5) ☐ Claim(s) _____ is/are allowed.

6) ☒ Claim(s) *1-25* is/are rejected.

7) ☒ Claim(s) *12, 13, 24 and 25* is/are objected to.

8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9) ☐ The specification is objected to by the Examiner.

10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.

    Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.

    If approved, corrected drawings are required in reply to this Office action.

12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

13) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

    a) ☒ All b) ☐ Some * c) ☐ None of:

      1. ☒ Certified copies of the priority documents have been received.

      2. ☐ Certified copies of the priority documents have been received in Application No. _____ .

      3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

    * See the attached detailed Office action for a list of the certified copies not received.

14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

    a) ☐ The translation of the foreign language provisional application has been received.

15) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)

2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)

3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) *4* .

4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .

5) ☐ Notice of Informal Patent Application (PTO-152)

6) ☐ Other: .

DETAILED ACTION

Remark

- This Office Action is in response to applicant's preliminary amendment filed on May 19, 2000, which has partially been entered as paper number 3.

- By this amendment, the applicant has amended claims 1, 4, 5, 7, 9, 12, 13, 14, 17, 19, 21, 24 and 25. The amendment to claim 1 has not been entered since it is not complied with the requirements of 37 CFR 1.121.

Drawings

1.   The drawings are objected to as failing to comply with 37 CFR 1.84(p)(4) because reference character "9" has been used to designate both "hologram" and "common digital image". A proposed drawing correction or corrected drawings are required in reply to the Office action to avoid abandonment of the application. The objection to the drawings will not be held in abeyance.

Priority

2.   Receipt is acknowledged of papers filed under 35 U.S.C. 119 (a)-(d) based on an application filed in European on November 20, 1997. Applicant has not complied with the requirements of 37 CFR 1.63(c), since the oath, declaration or application data sheet does not acknowledge the filing of any foreign application. A new oath, declaration or application data sheet is required in the body of which the present application should be identified by application number and filing date. *The priority date listed in the oath/declaration is not correspondent to the filing date on the priority document.*

Claim Objections

3.   **Claims 12, 13, 24 and 25 are objected** to under 37 CFR 1.75(c) as being in improper form because a multiple dependent claim cannot depend from *another multiple dependent* claim (such as 10

and 22). Furthermore a multiple depended claim should refer to other claims in *alternatively* manner.

The phrase "the method according to claim 10 (or 22) ... a method according to any one of claims 1-9 (or 14 to 21)" recited in claims 12, 13 (or 24 and 25) are not allowed. See MPEP § 608.01(n). *Accordingly, the claims 12, 13, 24 and 25 are not been further treated on the merits.*

Claim Rejections - 35 USC § 112

4.   The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

5.   **Claims 8, 10-13 and 20 and 22-25 are rejected under 35 U.S.C. 112, first paragraph,** as containing subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

The specification fails to teach what is considered to be the "convolutional product ... of two components by applying the transformation which is the inverse of said complex of the transform to the product of the respective complex transforms of said two components". Firstly the statement fails to teach what are the *"two components"* to adequately teach the operation of the convolution product. Secondly the statement does not adequately teach about the operation of a convolution product.

A *convolution* is defined as: $f(x) = \int g(u)h(x-u)du$, with the integral between (negative infinity to positive infinity). It is a measure between the correlation between to functions $g(u)$ and $h(u)$. In this case, there are no definitions for the "two components" and there is no proper definition for the operation of the convolution, which makes the function not enabling.

The specification also fails to teach how can the amplitude be determined as "determining amplitude values each depending on the square root of a corresponding value", recited in claims 6 and 18. It is not clear what is this "amplitude value" and what is the "corresponding value". If the amplitude value is referred to the computed hologram then it should be referred as the "square root of the amplitude transmittance of the sum (or interference) of the diffracted wave and the reference wave".

6.   The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

7.   **Claims 1-25 are rejected under 35 U.S.C. 112, second paragraph**, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

The claims are generally *narrative* and *indefinite*, failing to conform with current U.S. practice. They appear to be a literal translation into English from a foreign document and are replete with grammatical and idiomatic errors.

The phrase "combining said holograms to form a hologram" recited in claims 1 and 14 is indefinite and confusing, since it is not sure how does a plural holograms form a single hologram.

The relationship between the "respective different viewpoints" recited in claims 1 and 14 and the "matrix of points" recited in claims 2 and 15 is not positively stated which renders the scope of the claims unclear.

The phrase "the three-dimensional space" recited in claims 2, 14, lacks proper antecedent basis.

The phrase "simulating the production of a diffracted image resulting from the diffraction of an optical wave ..." recited in claims 5 and 17 are confusing, in error and not making any sense. It is not clear what is considered as a production of a diffracted image and it is also not clear how does the optical wave relate to complex image or any other image.

The phrase "a common digital image" recited in claims 9 and 21 is indefinite and confusing since it is not clear what is considered to be the digital image here.

The phrase "two components" recited in claims 8 and 20 are not defined which makes the scope of the claims unclear. The description of claims 8 and 20 is confusing and in error.

The *applicant* is respectfully reminded to clarify **ALL** of the *discrepancies* in the claims to make the claims in comply with the requirements of 35 USC 112, first and second paragraphs. The examiner can only point out a few; it is applicant's responsibility to correct all of the discrepancies.

Claim Rejections - 35 USC § 102

8.   The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

9.   **Claims 1-4 and 14-16 are rejected under 35 U.S.C. 102(b) as being anticipated by the patent issued to Haines (PN. 4,969,700).**

Haines teaches a system and method for generating holograms from a *computer model* of any *object* (30, Figure 4) wherein the method comprises the step of *computing* a *set* of *two-dimensional images* (200 and 400) representing the *object* (30) from perspective *different viewpoints* (52 and 54) in a three-dimensional space, the step of *computing element holograms* (52 and 54) for the corresponding two-dimensional images wherein the element holograms are *combined* to form the hologram (50) of the object, (please see Figure 4 and columns 3-6). Haines teaches to use computer model for representing any object that are three dimensional in extend. This means the object is a *virtual* three-dimensional object.

The different perspective *viewpoints* (52 and 54) constitute a *matrix* of *points* in a first geometric plane (50) that is separate from the object. The set of two-dimensional images on a second plane is formed by the projection of the object as seen from the respective viewpoints (52 and 54) on the first geometrical plane.

Haines teaches that the element hologram for each of two-dimensional image is calculated using technique including Fourier transformation.

This reference has therefore anticipated the claims.

Claim Rejections - 35 USC § 103

10.   The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11.   **Claims 5-13 and 17-25 are rejected under 35 U.S.C. 103(a)** as being unpatentable over the patent issued to **Haines** in view of the patent issued to **Saito** et al (PN. 5,668,648) and "Fourier transform computer-generated hologram: a variation on the off-axis principle" by **Michelin et al** (SPIE vol. 2176 1994/249).

The method and system for making computer generated hologram from a computer model of any object taught by *Haines* as described for claims 1 and 14 above has met all the limitations of the claims. Haines teaches that the element holograms correspond to the set of the two-dimensional images are obtained by calculating the amplitude and phase of the interference between the sample rays and reference ray using *Fourier* transformation. The amplitude obtained generally is complex amplitude, (please see column 5, lines 50-55).

This reference has met all the limitations of the claims with the exception that it does not

explicitly teach the calculation steps recited in the claims for calculating the element holograms. **Saito et**

al in the same field of endeavor teaches a computer-assisted holographic display apparatus that is

comprised of a *diffraction image computation section* (12) for receiving an input image data signal that

represents a three dimensional object (20) and to compute the corresponding diffraction pattern data with

a first sampling density. The apparatus further comprises *second computation section* that is connected to

the diffraction image computation section to subject the diffraction pattern data to the *interpolation*

process (28) so as to created *interpolated diffraction pattern data* with a *second sampling density* that is

increased (i.e. an oversampling process). A *third computation section* (30) is connected to the second

section to compute the *interference pattern data* between the *interpolated* diffraction data pattern and a

reference wave. The interference pattern data is obtained by using the multipliers (174, 176, Figure 8)

and adder (178, Figure 8), which corresponds to the addition (or superposition) of the diffraction wave

and reference wave. Saito et al teaches that Fourier transformation could be used in the computation

process. Saito further teaches that the computer-generated holograms are displayed on a *spatial light*

modulator (16, Figure 1) wherein light source may be used to physically reproduce the hologram image

of the object. With regard to claims 12-13 and 24-25, light sources of different color can be used to

reproduce holograms of different colors, (please see Figure 12). **Michelin et al** in the same field of

endeavor also teaches the standard computation process for making Fourier-transform computer-

generated hologram that includes using Fourier transformation to make the original planar image f, (i.e. a

real function) to become a complex function. A complex field representing the reference wave then is

added to the complex image function to compute the amplitude transmittance, (please see page 250). It

would then have been obvious to one skilled in the art to apply the teachings of Saito and Michelin et al to

modify the computer generated hologram of Haines to efficiently compute the element hologram

information and to display the element holograms on a spatial light modulator such as liquid crystal

display.

Double Patenting

12.   The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970);and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).
       A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).
       Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

13.   Claims 1-25 are rejected under the judicially created doctrine of obviousness-type double

patenting as being unpatentable over claims 1-32 of **U.S. Patent No. 6,344,909** in view of the patent

issued to Haines (PN. 4,969,700).

The instant application and the cited patent teach exactly the same calculation process for

producing hologram from two dimensional object images with the exception that the cited patent does not

claim the procedure of obtaining the two-dimensional image data from a three dimensional object.

However the steps for obtaining the set of two-dimensional images representing different viewpoints in

three-dimensional space of an object is commonly known in the art as described in the prior art patent

issued to Haines. Such difference therefore does not give a patentable distinction between the instant

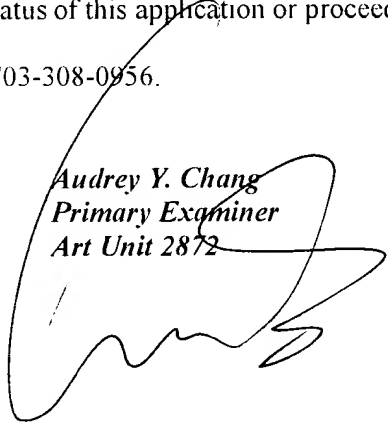application and the cited patent (PN. 6,344,909).

Conclusion

14.   The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. US patent issued to Takemori teaches an apparatus and method for displaying computer-generated hologram.

15.   Any inquiry concerning this communication or earlier communications from the examiner should be directed to Audrey Y. Chang whose telephone number is 703-305-6208. The examiner can normally be reached on Monday-Friday (8:00-4:30), alternative Mondays off.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cassandra Spyrou can be reached on 703-308-1637. The fax phone numbers for the organization where this application or proceeding is assigned are 703-872-9318 for regular communications and 703-872-9319 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is 703-308-0956.

Audrey Y. Chang
Primary Examiner
Art Unit 2872

A. Chang, Ph.D.
February 21, 2003